



DECLARATION

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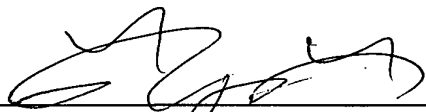
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I, Akira Yamanoi, a national of Japan, c/o
Asamura Patent Office of 331-340, New Ohtemachi Building
2-1, Ohtemachi-2-chome, Chiyoda-ku, Tokyo, Japan do
hereby solemnly and sincerely declare:-

- 1) THAT I am well acquainted with the Japanese
language and English language, and
- 2) THAT the attached is a full, true, accurate and
faithful translation into the English language made
by me of JIS P 8148⁻¹⁹⁹³.

The undersigned declares further that all
statements made herein of his own knowledge are true and
that all statements made on information and belief are
believed to be true; and further that these statements
were made with the knowledge that willful false
statements and the like so made are punishable by fine
or imprisonment, or both, under Section 1001 of Title 18
of the United States Code and that such willful false
statements may jeopardize the validity of the appli-
cation or any patent issuing thereon.

Signed this 10th day of July , 2003.


Akira Yamanoi

Testing method for diffuse blue reflectance factor of paper and board (ISO brightness)

1. Applied scope

This standard specifies a method for measuring brightness of white and near-white papers and boards in accordance with a diffused illumination • 0° light-intercepting method.

Remarks 1. Samples containing fluorescent brightening agents may be measured according to the method prescribed in this standard. In this case, the brightness varies depending upon spectral energy distribution of illuminating light including ultraviolet region of light illuminating a sample. Thus, when brightness values are compared, measurement has to be carried out by use of a photometer wherein spectral energy distribution of illuminating light is kept constant.

Remarks 2. The following standards are cited in this standard.

JIS P 3801 Filter paper (for chemical analysis)

JIS P 8110 Method for sampling paper for
testing

JIS P 8111 Pretreatment of paper for testing

JIS R 3503 Glass apparatus for chemical
analysis

JIS Z 8105 Glossary of color terms

JIS Z 8120 Glossary of optical terms

JIS Z 8401 Guide to rounding of numbers

JIS Z 8722 Method for measuring color of
substance

JIS Z 8724 Method for measuring color of
light source

ISO 2469: 1977 Paper, board and pulps -
Measurement of diffuse reflectance factor

Remarks 3. The following is the international standard
corresponding to this standard:

ISO 2470: 1977 Paper and board - Measurement
of diffuse blue reflectance factor (ISO brightness)

2. Definitions of terms

For the purpose of this standard, the
definitions of JIS Z 8105, JIS Z 8120, JIS Z 8722 and
JIS Z 8724, and the following definitions apply.

(1) Relative spectral distribution function $F(\lambda)$

Product of relative spectral distribution of light source, spectral transmittance and reflectance of optical system, spectral transmittance of filter and spectral responsivity is represented as a function of wavelength.

(2) Brightness (ISO brightness)

As a degree of brightness of paper and board, intrinsic solid angle reflectance⁽¹⁾ measured in accordance with the relative spectral distribution function $F(\lambda)$ in diffuse illumination • 0° light-intercepting shown in Table 1.

Note (1): The intrinsic solid angle reflectance denotes solid angle reflectance of test piece bundle wherein test pieces are piled in such number that measured value of solid angle reflectance no more changes even if the thickness of the sample piece bundle doubles.

Incidentally, this brightness is known as ISO brightness.

Table 1 Relative spectral distribution function $F(\lambda)$
of photometer in measurement of brightness

Wave- length λ (nm)	$F(\lambda)$ arbi- trary unit	Wave- length λ (nm)	$F(\lambda)$ arbi- trary unit	Wave- length λ (nm)	$F(\lambda)$ arbi- trary unit
395	0.0	440	57.6	485	34.0
400	1.0	445	70.0	490	20.3
405	2.9	450	82.5	495	11.1
410	6.7	455	94.1	500	5.6
415	12.1	460	100.0	505	2.2
420	18.2	465	99.3	510	0.3
425	25.8	470	88.7	515- 700	0.0
430	34.5	475	72.5		
435	44.9	480	53.1		

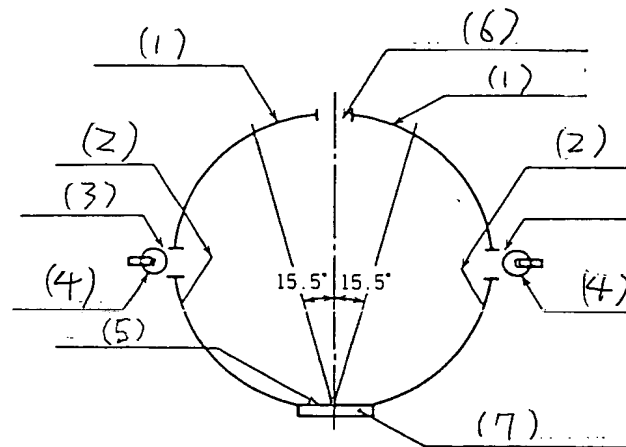
3. Apparatus, instrument, reagent and reference material

3.1 Photometer

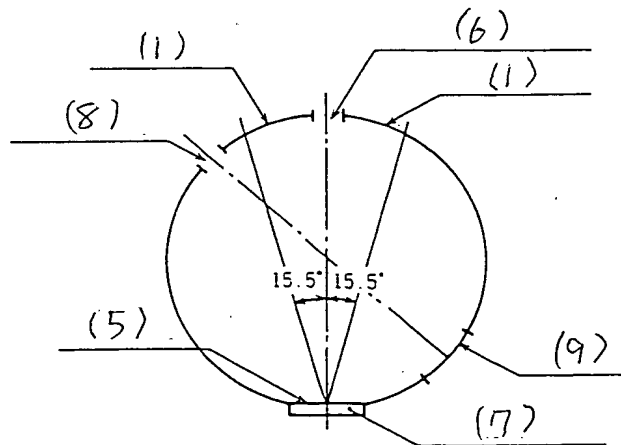
There is used a photometer complying with the following geometric properties, illuminating light, photometric properties and spectral properties (see Fig 1).

Fig. 1 Schematic view of photometer

Front view



Side view



In the above drawings, each numeral denotes as follows.

- (1): gloss trap
- (2): baffle
- (3): incidence opening
- (4): illumination light source
- (5): sample surface opening
- (6): light-intercepting opening for sample
- (7): sample (test piece bundle)
- (8): light-intercepting opening for reference
- (9): referential white surface

3.1.1 Geometric properties

Geometric properties are measured as follows.

- (1) By use of an integrating sphere 150 mm in diameter, a sample surface and a referential surface are subjected to diffused lighting. (Light from the light source is not directly illuminated on the sample surface or referential white surface.)
- (2) On the inside wall of the integrating sphere, area in a circle at a half angle within $15.5^{\circ} \pm 0.5^{\circ}$ from the center of the light-intercepting opening for a sample is colored in black (gloss trap).
- (3) The total area of the openings of the integrating sphere (sample surface opening, incidence opening,

light-intercepting opening for sample, light-intercepting opening for reference, etc.) is not more than 7.5% based on the whole area of the inside wall of the integrating sphere wherein area of gloss trap portion is not included in the area of the openings.

(4) Diameter of the sample surface opening is not more than 35.0 mm.

(5) The light-intercepting portion for sample and light-intercepting portion for reference receive reflected light from circles not less than 30.0 mm in diameter in the sample surface and referential white surface.

(6) The light-intercepting portion for sample must not receive reflected light from edge of the sample surface opening.

(7) The light-intercepting portion for sample and light-intercepting portion for reference receive reflected light in a direction wherein angle between the sample surface and normal line of the referential white surface is 0° . The pencil of light rays received by the light-intercepting portion for sample and light-intercepting portion for reference must not contain light rays 4° or more in slope angle against the central line.

3.1.2 Illuminating light

White light from illumination light source is subjected to diffused illumination by use of an integral sphere.

3.1.3 Photometric propre and spectral property

Photometric property and spectral property are in accordance with either of the following property A or property B.

(1) Property A

(a) The photometer must have light-intercepting side into which various filters can be inserted, and the spectral properties must accord with the relative integrated spectral distribution function $F(\lambda)$ shown in Table 1⁽²⁾.

Note (2): In this case, barycentric wavelength is 457.0 ± 0.5 nm and half band width is 44 nm.

(b) Linearity of photometric value is not more than 0.3% in terms of solid angle reflectance.

(c) Brightness is calculated by the following formula

(1).

$$IBR = \frac{R_w \times r \times r'_w}{r_w \times r'} \quad (1)$$

wherein IBR: brightness of common standard white surface

r : light-intercepting signal in light-intercepting portion for sample when sample is placed on sample surface opening

r_w : light-intercepting signal in light-intercepting portion for sample when common standard white surface is placed in sample surface opening

r' : light-intercepting signal in light-intercepting portion for reference when sample is placed in sample surface opening

r'_w : light-intercepting signal in light-intercepting portion for reference when common standard white surface is placed in sample surface opening

(2) Property B

(a) Intrinsic spectral solid angle reflectance is measured by a method prescribed in JIS Z 8722, item 4.3.3 (measurement of spectral solid angle reflectance).

(b) As to light-intercepting portion for sample and light-intercepting portion for reference, spectral solid angle reflectance can be measured at wavelength interval of 20 nm or less in wavelength range of 400-700 nm.

When wavelength scale is adjusted to arbitrary nominal wavelength, barycenter wavelength of the wavelength band is within 1 nm from the nominal wavelength.

(c) Linearity of photometric value is not more than

0.3% in terms of spectral solid angle reflectance.

(d) Brightness is calculated by the following formula

(2):

$$IBR = \frac{\sum_{\lambda=400}^{700} F(\lambda) \times R_{\infty}(\lambda)}{\sum_{\lambda=400}^{700} F(\lambda)} \quad (2)$$

wherein IBR: brightness

$F(\lambda)$: relative spectral distribution function
shown in Table 1

$R_{\infty}(\lambda)$: intrinsic spectral solid angle
reflectance

3.2 Common standard white surface

The common standard white surface prescribed in the item 4.3.4 (common standard white surface) of JIS Z 8722 is used.

3.3 Administrative standard white surface

The common standard white surface the same as in the above item 3.2 is used.

3.4 Standard white surface

The standard white surface prescribed in the item 4.3.6 (standard white surface) of JIS Z 8722 is

used.

Remark 1. The standard white surface is used for fixing the scale of the common standard white surface and administrative standard white surface.

Remark 2. ISO 2469: ISO referential standard white surface level 2 prescribed in 1977 can be used as the standard white surface.

Remark 3. ISO 2469: ISO referential standard white surface level 3 prescribed in 1977 may be used instead of the standard white surface.

3.5 Black tube

A black tube or black box having a visual reflectance of 0.5% or less and a known reflectance is used.

3.6 Detergent

A detergent obtained by diluting a colorless surfactant containing no fluorescent brightener with distilled water is used.

3.7 Brush

A brush having soft synthetic fiber as thrum is used.

3.8 Desiccator

A desiccator prescribed in JIS R 3503 is used, and activated alumina or silica gel is used as a desiccating agent.

3.9 Filter paper

The type 4 prescribed in JIS P 3801 is used.

4. Test piece

Test pieces are obtained in the following manner.

- (1) A test paper is sampled according to JIS P 8110.
- (2) Obvious defective portions such as dust, fleck and blot are removed from the test paper, and the test paper is cut into test pieces having a size of about 75 X 150 mm. The number of the test pieces is 10 or more and enough so that the brightness no more changes even if the thickness of the sample piece bundle doubles.
- (3) A protector paper is applied to the upper side and lower side of the sample piece bundle so that the test pieces are protected from stain, light and heat.

Remark. The protector paper may be the same as the test piece if the test piece is nearly as opaque as ordinary woodfree papers or coated papers. In case that the test piece may be discolored only with the protector paper,

the test piece is protected from stain, light and heat by other means.

(4) The test piece is pretreated according to JIS P 8111.

5. Operation

5.1 Management of common standard white surface and administrative standard white surface

These surfaces are managed in the following manner.

(1) The common standard white surface and administrative standard white surface are rinsed with distilled water, and then brushed with a detergent. Thereafter, the surfaces are sufficiently rinsed with distilled water, and water is absorbed by a filter paper followed by drying in a desiccator.

(2) As to the thus washed common standard white surface and administrative standard white surface, brightness and spectral solid angle reflectance are periodically measured after the scale of the photometer is adjusted with the standard white surface to confirm that there is no difference between the measured value and scale-adjusted value.

(3) Brightness or spectral solid angle reflectance of the common standard white surface is measured once per day after the scale of the photometer is adjusted with the administrative standard white surface to confirm that there is no difference between the measured value and scale-adjusted value.

(4) If there is difference between the measured value and scale-adjusted value in (2) or (3) above, the common standard white surface and administrative standard white surface are washed, the scale of the photometer is adjusted with the standard white surface, and then the common standard white surface and administrative standard white surface are measured. If there is still difference therebetween, the scale-adjusted value is changed to the measured value.

(5) The standard white surface is periodically replaced with new one.

5.2 Measurement

(1) Measurement is conducted in standard conditions prescribed in JIS P 8118.

(2) The scale of the photometer is adjusted with the black tube and common standard white surface.

(3) The protector papers on the upper and lower sides of the test piece bundle are removed, the front side of

the test piece bundle as it stands is measured in 0.1% unit. Then the measured test piece is relocated to the opposite side, and the second test piece is measured. This procedure is repeated to measure ten test pieces.

(4) In the same manner as (3), the back side is measured.

6. Calculation

As to each of front side and back side of the test piece, an average value of brightness is measured and rounded out in single figure of decimal point according to JIS Z 8401.

7. Report

In the report, the following items are listed depending upon necessity.

- (1) Test standard name and standard number
- (2) Kind and name of test piece
- (3) Photometric property and spectral property of the photometer (property A or property B)
- (4) Manufacturer and model of the photometer used
- (5) Measurement date and place
- (6) Test number of times
- (7) Average value of brightness (average of each of front and back sides)

(8) If any, conditions or manner contrary to this standard

(9) Other necessary items